Exercice :

Dans chacun des cas ci-dessous, calculer la limite de la suite (u_n).

1°) $u_n = \dfrac{1}{2-\dfrac{1}{\sqrt{n}}} - 3n^3$, $n \geq 1$.

2°) $u_n = -\dfrac{1}{n} + \sqrt{\dfrac{5n+3}{2n+9}}$, $n \geq 1$.

3°) $u_n = \dfrac{1}{\sqrt{4n+1}}\sqrt{n+\dfrac{1}{2}}$, $n \geq 0$.

1°) $\lim\limits_{n\to+\infty} u_n = \lim\limits_{n\to+\infty} \dfrac{1}{2-\underbrace{\frac{1}{\sqrt{n}}}_{\to 0}} \underbrace{-3n^3}_{\to +\infty} = \boxed{-\infty}$

2°) $\lim\limits_{n\to+\infty} u_n = \lim\limits_{n\to+\infty} \underbrace{-\frac{1}{n}}_{\to 0} + \sqrt{\dfrac{5n+3}{2n+9}} = \boxed{\dfrac{\sqrt{10}}{2}}$

$\lim\limits_{n\to+\infty} \dfrac{5n+3}{2n+9} = \lim\limits_{n\to+\infty} \dfrac{5n}{2n} = \dfrac{5}{2}$

3°) $\lim\limits_{n\to+\infty} u_n = \lim\limits_{n\to+\infty} \dfrac{1}{\sqrt{4n+1}} \sqrt{n+\dfrac{1}{2}}$

$= \lim\limits_{n\to+\infty} \sqrt{\dfrac{n+\frac{1}{2}}{4n+1}} = \sqrt{\dfrac{1}{4}} = \boxed{\dfrac{1}{2}}$

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